Journal of the Lepidopterists' Society
62(3), 2008, 143-147

TAXONOMIC AND DISTRIBUTIONAL STUDIES ON THREE *LASIOMMATA* WESTWOOD SPECIES RESTRICTED TO NORTH-WEST HIMALAYA (NYMPHALIDAE: SATYRINAE)

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ABSTRACT. Three species of the genus *Lasiommata* Westwood, (*maerula* Felder, *schakra* Kollar, and *menava* Moore collected from North-West Himalaya have been examined in the light of genitalic studies. Illustrations and a new key to the three species are provided.

Additional key words: Genitalia, brachia, angular appendices, signa, genital plate.

Himalaya is the hub of a great many butterfly species occurring in different ranges. Recent field work in North-West Himalaya has led to the collection of three species that have been identified as *Lasiommata maerula* Felder, *schakra* Kollar, and *menava* Moore. Marshall & de Niceville (1883) placed these species in the genus *Amecera* Butler, which, with *Lasiommata* Westwood, was synonymized under *Satyrus* Latreille by Bingham (1905). Without assigning specific reasons, Evans (1932) and Talbot (1947) assigned these species to *Pararge* Hübner, with *Satyrus* Bingham (Not Latreille), *Lopinga* Moore, *Lasiommata* and *Amecera* as its synonyms (Talbot 1947). In a key to European butterfly genera, Higgins (1975) distinguished *Lasiommata* from *Pararge* by the presence of a pyriform antennal club in the former versus slender antennal club in the latter, placing both in the subfamily Pararginae. Based on this character, the three species studied here belong to *Lasiommata*. A key to the species, diagrams of their genitalia and their distributions are presented here.

Key to Species
Lasiommata Westwood
Common name: **The Walls**

Lasiommata Westwood, 1841, In Humphreys & Westwood, Brit. Butt. Transformations [ed. 1]: 65.

Type species. *Papilio megera* Linnaeus

1. Forewing upperside without brand in male; male genitalia with aedeagus comparatively short, with four pairs of spines at posterior end *maerula* Felder

1a. Forewing upperside with brand in male from inner margin to vein M_2; male genitalia with aedeagus relatively long, with spines either in two pairs or absent at posterior end 2

2. Forewing upperside with black ocellus ringed with broad fulvous ring, subapical similar minute ocellus above it wanting; hindwing upperside with marginal and submarginal lines distinct; female with additional fulvous band on inner side; male genitalia with brachia longer than half the length of uncus; female genitalia with lobes of lamella antevaginalis nearly rounded *schakra* Kollar

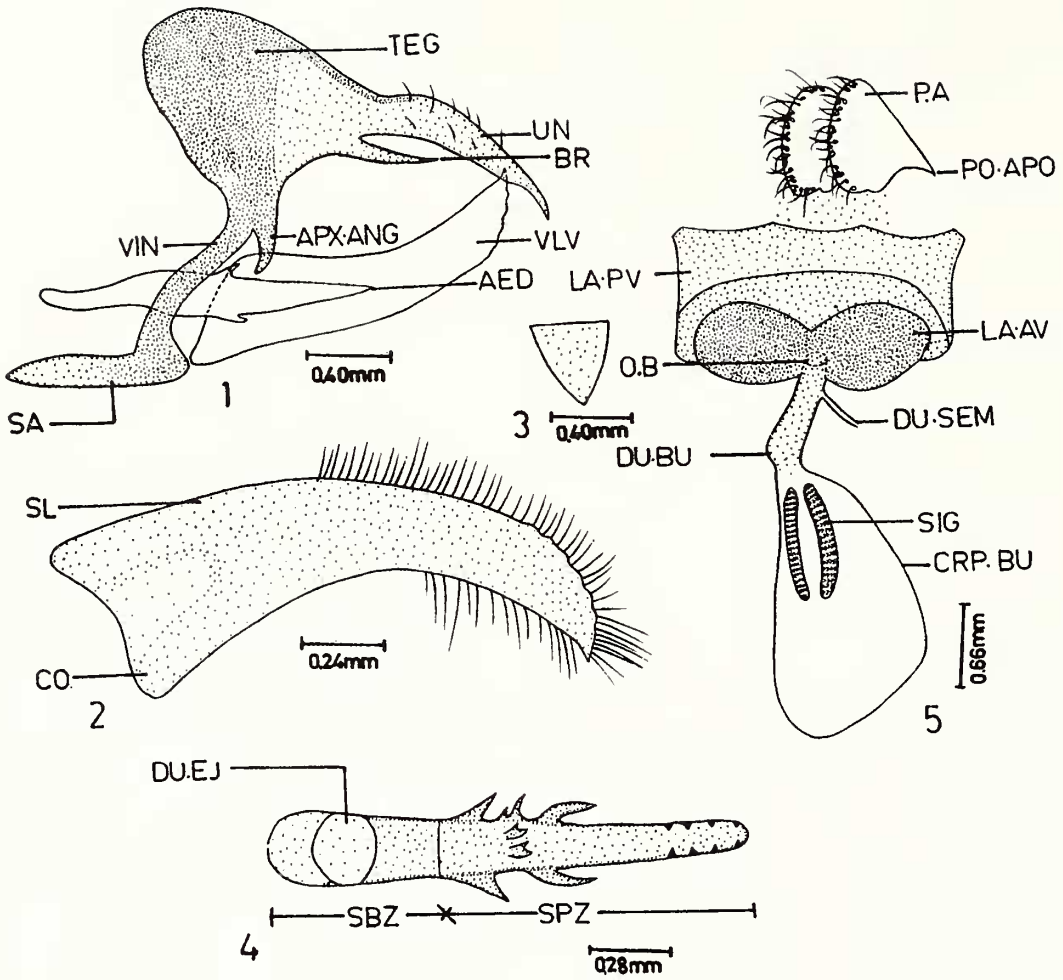
2a. Forewing upperside with black ocellus ringed with ill-defined, faint, yellow ring, a similar but smaller minute subapical ocellus present; hindwing upperside with marginal and submarginal lines missing; female with orange yellow patch between cell and outer margin; male genitalia with brachia nearly1/4 to the length of uncus; female genitalia with central process of lamella antevaginalis more or less triangular *menava* Moore

Genitalic Descriptions
Lasiommata maerula Felder
Common name: **The Scarce Wall**

Felder, 1867, Reise Novara, Lep. 2: 496 (*Lasiommata*)

Male genitalia (Figs. 1–4). Uncus nearly equal to tegumen, weakly curved ventrally, with pointed distal end, sparsely setose dorsally; brachia less than half the length of uncus; tegumen long and broad; appendices angulares somewhat conical; vinculum shorter than tegumen; saccus moderately long, broader proximally, narrower distally; valva elongated, parallel sided, with pointed apex; juxta more or less triangular; aedeagus short, four pairs of minute, dorsal spines at posterior end, two lateral pairs of spines nearly in the middle, two unequal lateral spines on one side between lateral pairs, a pair of mid-dorsal forked spines, suprazone longer than subzone, ductus ejaculatorius entering dorsad.

Female genitalia (Fig. 5). Corpus bursae elongated, membranous; signa moderately long, paired, parallel, situated longitudinally in the posterior half of corpus bursae, beset with minute teeth; ductus bursae small, moderately sclerotized; ductus seminalis entering ductus bursae near ostium bursae; lamella antevaginalis with two oval, lobe-like structures; lamella postvaginalis quadrangular plate-like; apophysis anterioris wanting, apophysis posterioris small, membranous; papilla analis oblong, pilose.



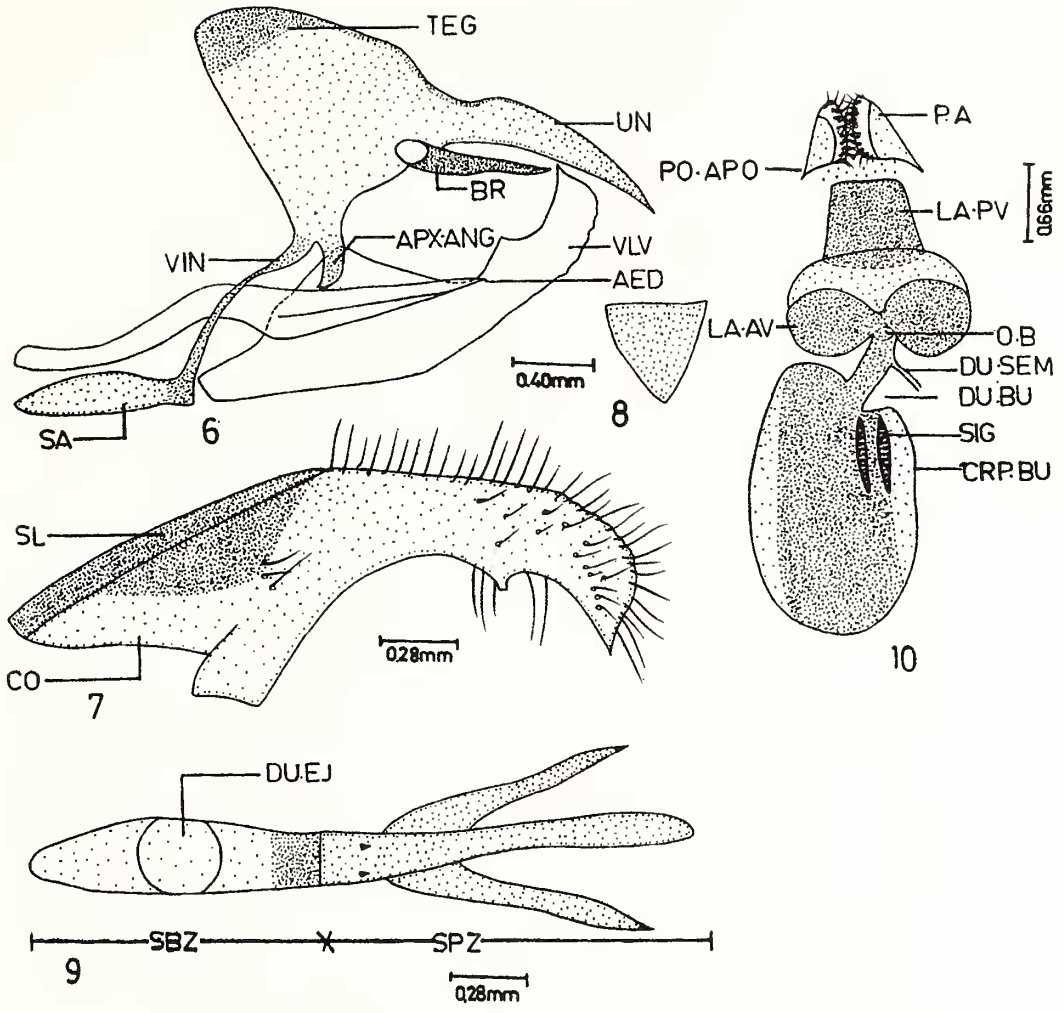
FIGS. 1-5. *Lasiommata maerula maerula* Felder: **1.** Male genitalia (lateral view). **2.** Valva (inner view). **3.** Juxta. **4.** Aedeagus (dorsal view). **5.** Female genitalia (Ventral view). (AED: Aedeagus, APX.ANG: Appendix angularis, BR: Brachium, CO: Costa, CRP.BU: Corpus bursae, DU.BU: Ductus bursae, DU.EJ: Ductus ejaculatorius, DU.SEM: Ductus seminalis, O.B: Ostium Bursae, P.A: Papilla analis, PO.APO: Apophysis posterioris, SA: Saccus, SBZ: Subzonal portion of aedeagus, SIG: Signum, SL: Sacculus, SPZ: Suprazonal portion of aedeagus, TEG: Tegumen, Un: Uncus, VIN: Vinculum, VLV: Valva)

Length of forewing. Male: 27.0–28.0 mm (n=5); Female: 28.0 mm (n=2).

Material examined. Himachal Pradesh: 1♂, 17.ix.92, Sangla, 2680 m, Kinnaur; 1♂, 18.ix.92, Nichar, 2380 m, Kinnaur; 1♂, 18.vii.92, Purthi, 2650 m, Pangi, Chamba. Uttarakhand: 2♂, 29.iv.92, Tiffon Top, 2400 ♀, Nainital; 2m, 28.iv.92, China Peak, 2350 m, Nainital.

Remarks. Relevant literature and present sampling shows that *Lasiommata schakra* (Kollar) is a highly variable species as mentioned under the remarks. Besides making a mention that *maerula* Felder is apparently very rare, Marshall & de Niceville (1883) stated that "probably *maerula* is only a casual variety of *schakra* Kollar, but we retain it as a distinct species, pending further investigations and in deference to Dr. Felder's high authority".

The present field work shows that the species under reference is definitely rare and its males and females have been found to fly together with *L. schakra* in the Kumaon Himalayas (Nainital). The males of *maerula* lack forewing brand and also differ from *schakra* in their marginal and submarginal lines on the upperside of the hindwings. The female is, however, more similar to females of *schakra* and reliable discrimination is possible only through examination of the genitalia. They differ in structures such as the signum, genital plate, ductus bursae and papilla analis. The subspecies is represented by its nominotype.



FIGS. 6-10. *Lasiommata schakra schakra* (Kollar): **6.** Male genitalia (lateral view). **7.** Valva (inner view). **8.** Juxta. **9.** Aedeagus (dorsal view). **10.** Female genitalia (Ventral view). (AED: Aedeagus, APX.ANG: Appendix angularis, BR: Brachium, CO: Costa, CRP.BU: Corpus bursae, DU.BU: Ductus bursae, DU.EJ: Ductus ejaculatorius, DU.SEM: Ductus seminalis, O.B: Ostium Bursae, P.A: Papilla analis, PO.APO: Apophysis posterioris, SA: Saccus, SBZ: Subzonal portion of aedeagus, SIG: Signum, SL: Sacculus, SPZ: Suprazonal portion of aedeagus, TEG: Tegumen, Un: Uncus, VIN: Vinculum, VLV: Valva)

Lasiommata schakra (Kollar)

Common name: **The Common Wall**

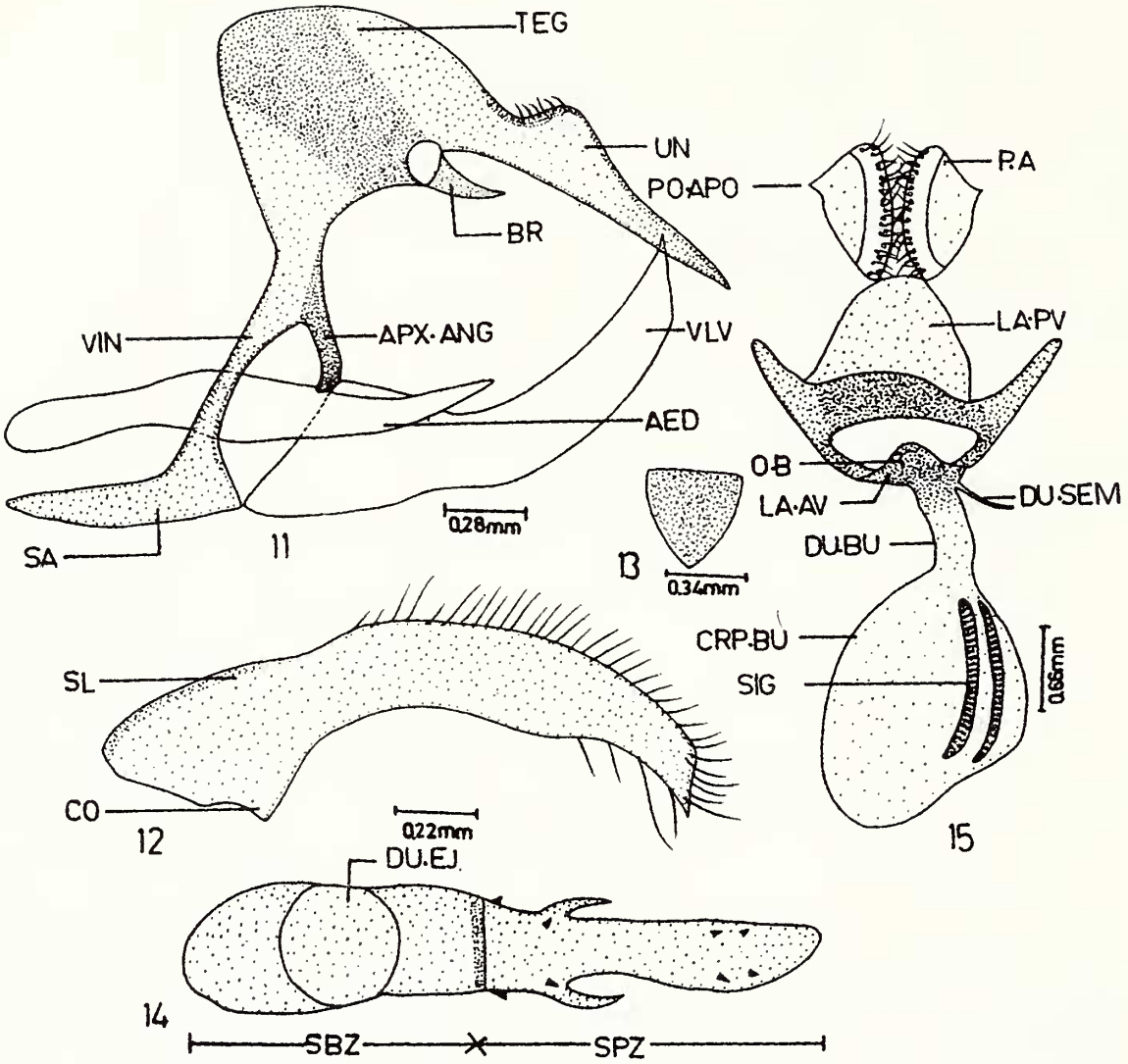
Kollar, 1844, In Hugel's Kashmir (4) 2: 446 (*Satyrus*).

Male genitalia (Figs. 6–9). Uncus slightly shorter than tegumen, broad at base, tapering posteriorly to pointed tip, notch present dorsally between uncus and tegumen; brachia longer than half the length of uncus, distal end pointed; tegumen broad; appendices angulares beak-shaped; vinculum smaller than tegumen, thin; saccus moderately long, narrow proximally and distally; valva elongate, almost parallel sided, with pointed apex, costa with broad, small process, sacculus long and narrow, dorsal margin with small process near distal end; juxta somewhat triangular; aedeagus long, tubular, with two long, lateral processes with pointed ends, two small mid dorsal spines present, subzone smaller than suprazone, ductus ejaculatorius entering dorsad.

Female genitalia (Fig. 10). Corpus bursae globular, well sclerotized in the middle; signa represented by two moderately long, scobinate patches situated longitudinally in the posterior half of corpus bursae; ductus bursae short; ductus seminalis attaching to ductus bursae near ostium bursae; lamella antevaginalis with two lateral, oval structures, below which lies a circular plate; lamella postvaginalis somewhat rectangular plate-like; apophysis anterioris wanting, apophysis posterioris small, membranous; papilla analis oblong, pilose.

Length of forewing. Male: 26.0–27.0 mm (n=96); Female: 25.0–29.0 mm (n=46).

Material examined. Himachal Pradesh: 7♂, 7♀, 28.vi.92, 2♂, 3♀, 3.vii.93, Dal Lake, 1790 m, Dharmsala, Kangra; 2♂, 26.iv.92, 4♂, 3♀, 29.vi.92, 1♂, 4.vii.93, Mcleodganj, 1768 m, Dharmsala, Kangra; 1♀, 30.vi.92, Bhagsunag, 1768 m, Dharmsala, Kangra; 8♂, 6♀,13.ix.92, Chowai, 1800 m, Kullu; 1♀, 20.vi.93, Manikaran, 1737 m, Kullu; 1♂, 18.vi.93, Palchan, 2050 m, Kullu; 2♀, 22.vi.93, Ooch, 1737 m, Manikaran, Kullu; 2♂, 27.vii.92, Kothi-Palchan, 2530 m, Kullu; 1♂, 19.vii.92, Purthi-Kellar, 2650 m, Pangi, Chamba; 1♂, 20.vii.92, Kellar, 2750 m, Pangi, Chamba; 3♂, 2♀, 19.vi.93, Tissa Bridge, 1750 m, Tissa, Chamba; 1♂, 30.iv.96, Katarwai, 1750 m, Tissa, Chamba; 1♂, 1♀,



FIGS. 11-15. *Lasiommata menava menava* Moore: **11**. Male genitalia (lateral view). **12.** Valva (inner view). **13.** Juxta. **14.** Aedeagus (dorsal view). **15.** Female genitalia (Ventral view). (AED: Aedeagus, APX.ANG: Appendix angularis, BR: Brachium, CO: Costa, CRP.BU: Corpus bursae, DU.BU: Ductus bursae, DU.EJ: Ductus ejaculatorius, DU.SEM: Ductus seminalis, O.B: Ostium Bursae, P.A: Papilla analis, PO.APO: Apophysis posterioris, SA: Saccus, SBZ: Subzonal portion of aedeagus, SIG: Signum, SL: Sacculus, SPZ: Suprazonal portion of aedeagus, TEG: Tegumen, Un: Uncus, VIN: Vinculum, VLV: Valva)

16.vi.93, Bharmani Nullah, 2195 m, Bharmour, Chamba; 1♀, 25.iv.96, Bakrota, 2039 m, Dalhousie, Chamba; 4♂,19.ix.92, 1♂, 23.vi.95, 4♂, 1♀, 8.vi.96, Kalpa, 2400 m, Kinnaur; 7♂, 15.ix.92, Bhabhanagar, 1381 m, Kinnaur; 1♀, 18.ix,91, Shimla, 2400 m; 1♀, 14.vi.92, Mahog, 2150 m, Chail, Shimla; 1♂, 2♀, 8.ix.92, Kumarsain, 1485 m, Shimla; 3♂, 25.vi.96, Koti, 2150 m, Chail, Shimla; 7♂, 1♀, 12.ix.92, Taklech, 1600 m, Rampur, Shimla; 4♂, 2♀, 28.v.92, Chambaghat, 1440 m, Solan; 6♂, 1♀, 29.x.92, Kasauli, 1731 m, Solan. Uttarakhand: 2♂, 1♀, 2.vi.93, Bhilaru Pumping Station, 1710 m, Mussoorie, Dehradun; 1♂, 3♀, 7.vi.93, Spring Road, 2005 m, Mussoorie, Dehradun; 1♀, 5.vi.93, Murray Electric Pumping Station, 1645 m, Mussoorie, Dehradun; 1♀, 8.vi.93, Dhanolti, 2250 m, Dehradun; 2♂, 9.vi.93, Bandhal Nadi, 640 m, Dhanolti, Dehradun,; 1♂,1♀, 15.vi.94, 3♂,1♀, 13.vi.95, Chakrata, 2100 m, Dehradun; 8♂, 3.vii.94, Ranikhet,1829 m, Nainital; 2♂, 2♀, 29.iv.92, Tiffon Top, 2400 m, Nainital. Jammu & Kashmir : 5♂, 29.viii.94, Patni Top, 2060 m, Jammu; 1♂, 29,viii.94, Kud, 1700 m, Patni Top, Jammu.

Remarks. *Lasiommata schakra* (Kollar) is one of the most common species collected along the banks of water bodies and stony areas in the localities cited above. Earlier works, such as Marshall & de Niceville (1883), Bingham (1905), Evans (1932), Talbot (1947)

and Wynter-Blyth (1957) did not define clearly the diagnostic characteristics, e.g. subapical ocellus along with other orange spots and post-discal ocelli on the dorsal and ventral sides of the hindwings. The number of orange spots on the dorsal surface of the forewings is always four (including the subapical ocellus), but their size and spacing vary in different individuals from the same as well as different localities. Apart from the subapical ocellus, the remaining three orange spots are well developed in ninety-two individuals and obscure in fifty individuals. The number of post-discal ocelli/spots on upperside of the hindwings varies from three to six. Out of these, three are always black, with white pupils and ochraceous ringed. Talbot (1947) has erroneously indicated that this post-discal row of three to six spots is always black. However, critical examination shows that three black spots are conspicuous in all individuals while fifty-one individuals have one additional yellow spot, thirty-five have two additional yellow spots and five individuals have three additional spots. These additional spots may or may not be black dotted. Individuals collected from the same locality also show variation in the number of these spots (e.g., five individuals with one additional spot and four with two additional spots from Dal Lake, Mcleodganj, Kangra). In view of this variation, six males and four females across its extremes were dissected and found conspecific. The subspecies is represented by its nominotype.

Lasiommata menava Moore

Common name: **The Dark Wall**

Moore, 1865, Proc. Zool. Soc. Lond.: 499 (*Lasiommata*).

Male genitalia (Figs. 11–14). Uncus subequal to tegumen, hump present dorsally at base, distal end pointed, notch present dorsally between uncus and tegumen; brachia short, nearly 1/4 length of uncus, pointed distally; tegumen broad; appendices angulares moderately long, curved inwardly distally; vinculum shorter than tegumen; saccus moderately long, broader proximally, narrower distally; valva elongated, nearly parallel sided, with pointed distal end; juxta more or less triangular; aedeagus long, tubular, proximal half broader, distal half narrow, two lateral moderately long processes, two pairs of minute dorsal spines near posterior end, one pair of minute dorsal spines at the base of lateral processes and another lateral pair of spines behind lateral processes, subzone smaller than suprazone, ductus ejaculatorius entering dorsad.

Female genitalia (Fig. 15). Corpus bursae oblong; signa long, paired, situated longitudinally, with scobinate patches; ductus bursae short and broad; ductus seminalis originates from ductus bursae near ostium bursae; lamella antevaginalis with central process small, somewhat triangular, lateral processes long, joined in the middle; lamella postvaginalis globular, plate-like; apophysis anterioris wanting, apophysis posterioris reduced, membranous; papilla analis ellipsoidal, pilose.

Length of forewing. Male: 25.0–30.0 mm (n=4): Female: 27.0–28.0 mm (n=6).

Material examined. Himachal Pradesh: 1♂, 5♀, 25.vi.95, 2♂, 1♀, 22.vi.96, Hurling, 3150 m, Kaza, Lahoul and Spiti; 1♂, 28.vi.95, Puh, 2700 m, Kinnaur.

Remarks. This species has been reported from many hilly areas, mentioned above (Marshall & de Niceville 1883; Evans 1932; Talbot 1947; Wynter-Blyth 1957). The new specimens, except one, were collected at Hurling along the Spiti River Valley. These localities are new distributional records for this species. One of the males collected from Hurling is different from the remainder as it is much darker in color and possesses only one ocellus in cell Cu1a. However, it is conspecific genitalically. The subspecies is represented by its nominotype.

Discussion

The present study shows that all three species are restricted to North-West Himalaya. Their male and female genitalia suggest that they form a single natural group. The male genitalic structures (e.g. dome shaped tegumen, uncus and distally pointed brachia, almost parallel sided valvae with pointed apex and aedeagus with dorsal teeth) conform to the type-species *megera* Linnaeus of the genus *Lassiomata* Westwood, as has been illustrated by Higgins (1975). The examination of the female genitalia of *maerula*, *schakra* and *menava* shows that paired signa (Pierce & Beirne, 1938) are always present in the corpus bursae. Also the posterior apophyses are reduced and the ductus seminalis always originates from near the ostium bursae.

Acknowledgements

The authors are grateful to the Indian Council of Agricultural Research, New Delhi for funding.

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Received for publication 3 January 2007; revised and accepted 15 April 2008.